Targets Management Office (TMO)

Aerial Targets Guide

As of: November 2010

Distribution Statement A.
This publication contains technical or operational information.
Approved for public release; distribution is unlimited.

1

Aerial Target Description

- **Flight Operations Using a Variety of Sub-Scale Fixed Wing, Full Scale Rotary Wing, and Ballistic Systems.**
- **Government Owned/Contractor Operated Targets**
- **Conducted at Various CONUS/OCONUS Sites.**

3

Points of Contact
Aerial Targets

Aerial Target Flight Service Operations:
Steve Moore (256)842-6461
steve.moore1@us.army.mil

Outlaw/Broadsword:
Brian Whitaker (256)842-0379
brian.k.whitaker@us.army.mil

Outlaw/Broadsword Flight Operations:
Dale Maupin (256)842-0441 dale.maupin@us.army.mil

4

Tow Targets:
Tony Still (256)842-0377 tony.still@us.army.mil

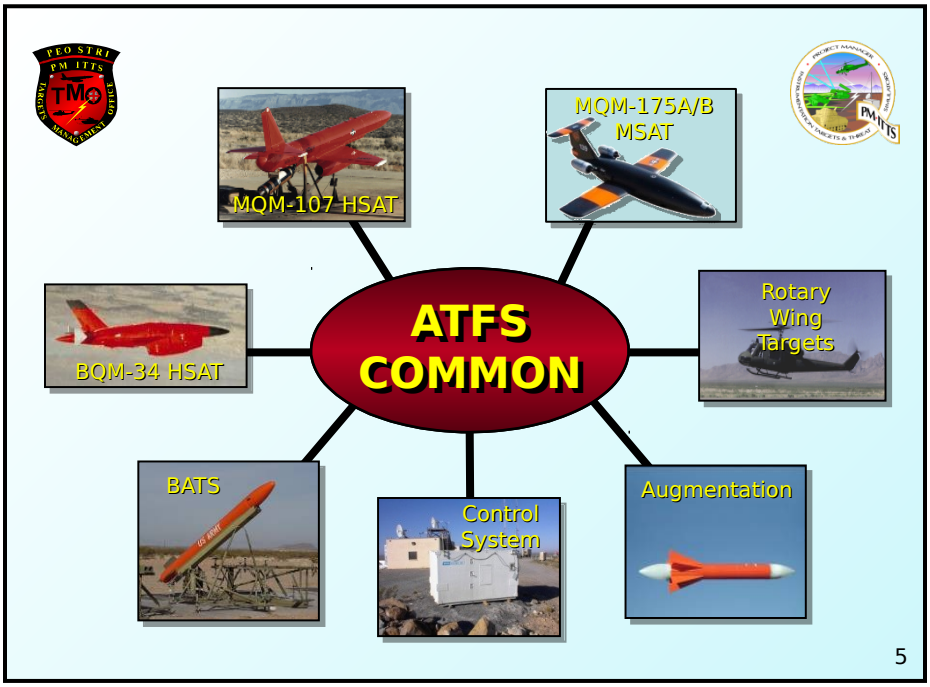
4

TMO Mission

To Provide Technically Advanced Targets and Target System Developments, Best Value Target System Procurement and Superior Life-Cycle Target Operations and Sustainment Support in All Three Domains To U.S. Army Transformation and Other Joint Service and Foreign Customers.

2

2



5

MQM-107 Streaker

ENGINE:
Model.....TRI60-5
Type .....Turbojet
FUEL:
Capacity.....~60 gals usable
Type JP-8
ALTITUDE:
Max .....40,000 ft
Min ..... 50 ft

AUGMENTATION & PACKAGES
Scoring
Active & Passive Radar
Infrared
Formation flights
Low altitude flights
Flares / Chaff__
ECM
Towed Targets (see pp 18-33)

7

7

BQM-34 Firebee

Weight: 2,500 lb
Payload: Int: 350 lbs
Ext: 350 lbs/wing

Speed: Max:
630 mph
550 knots

Control Sys
TTCS/U Shelter

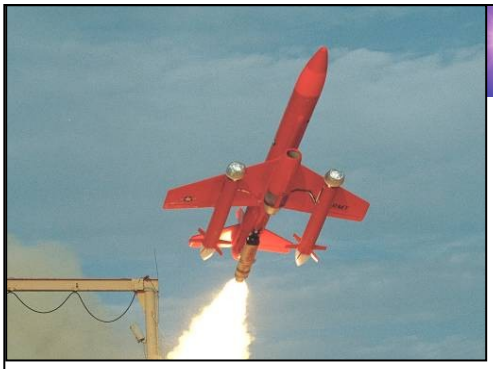
Launch
RATO

Unmanned Drone
Ground Crew: 6
Length: 274.8 in
Wingspan: 154.8 in
Height: 80.4 in

The BQM-34 Firebee is remotely piloted, fixed wing, subsonic, turbojet powered, reusable drone. Normal use is to simulate tactical threats by enemy aircraft and missiles for defense-readiness training, air-to-air combat training, and test and evaluation of weapon systems. Serving as the tug vehicle it can pull low-cost tow targets. During flight, the BQM-34 is line-of-sight remotely controlled. It is recovered via a parachute and reused if not shot down.

8

8



MQM-107 Streaker

Weight: 1,326 lbs
Payload: Int: 100 lbs
Ext: 100 lbs/wing

Speed: Max:
615 mph
535 knots

Control Sys
TTCS/U Shelter

Launch
RATO

Unmanned Drone
Ground Crew: 6
Length: 216.96 in
Wingspan: 118.5 in
Height: 63 in

The MQM-107 is a medium to high performance remotely controlled target. Normal use is for training surface-to-air and air-to air missile and anti-aircraft artillery crews. Its mission is to provide a realistic and economical aerial target, capable of simulating the performance of enemy aircraft and cruise missiles. Pulls towed targets. Deployable and recoverable via parachute if not shot down.

6

6

BQM-34 Firebee

ENGINE:
Model.....GE J-85-100
Type.....Turbojet
FUEL:
Capacity.....~100 gallons usable
Type JP-8
ALTITUDE:
Max.....55,000 ft
Min.....100 ft

Augmentation & Packages

Scoring
Active & Passive Radar
Infrared
Formation flights
Low altitude flights
Flares / Chaff__
ECM

9

9

dium Speed Aerial Target (MSAT) MQM-175A

MQM-175A

- Wingspan 59 in
- Length 71 in
- Max take-off wt. 112.44 lbs
- Payload capacity 13 lbs
- Propulsion 2 x 160 N
- Speed-Max 350 knots
- Altitude-Max 20,000 ft.
- Endurance 30 min
- TC/TM range 62.14 miles
- Launching Pneumatic catapult
- Recovery Parachute
- Piloting Manual, Automatic (waypoint navigation)
- Navigation GPS
- Data link UHF
- Opt. payload Radar amplifier, switchable during flight

MQM-175B

- Wingspan 71 in
- Length 84.7 in
- Max take-off wt. 165.35 lbs
- Payload capacity 17.6 lbs
- Propulsion 2 x 200 N
- Speed-Max 408 knots
- Altitude-Max 20,000 ft.
- Endurance 30-60 min
- TC/TM range 62.14 miles
- Launching Pneumatic catapult
- Recovery Parachute
- Piloting Manual, Automatic

11

11

MQM-170A Outlaw

Weight: 120 lbs
Payload: 15 lbs (may be increased by reducing fuel)

Speed: Max 125 mph 104 knots

Control Sys
- Manual
- Piccolo Ground Station
- TTGS-U

Launch
Pneumatic Rail Launched

Remotely Piloted Vehicle Target

Ground Crew: 2-3

Length: 106.29 in

Wing Span: 163.23 in

Height: 27.69 in

An aerial target capable of flying realistic tracking and live fire engagements for air defense training. Its primary mission is to support Air Defense Artillery qualification training, but the target is available to support test and evaluation missions as well as RDT&E and other training applications. It is low-cost, small tactical UAS size air vehicle, highly maneuverability, and has multi-mission capability.

12

MQM-175A

MQM-175B

Medium Speed Aerial Target (MSAT) MQM-175A

Weig[illegible]0/154 lb
Payload

Speed:
Min 85/116kts
Max350/427kt

Control Sys
Manual, Automatic (Waypoint Navigation)
UHF Data Link

Launch
Pneumatic Catapult

Unmanned Drone
Ground Crew:
Launcher – 3
Controller – 2

Length: MQM-175A 5.9 ft
MQM-175B 7 ft

Wing Span: MQM-175A 4.9 ft
MQM-175B 5.9 ft

Height: MQM-175A 1.7 ft
MQM-175B 1.7 ft

The MQM-175A/B is the latest addition to the family of sub-scale fixed wing targets in the Targets Management Office (TMO) operational inventory. Various configurations are available to support training and testing events for a variety of weapon systems. The MQM-175A is a durable, jet powered aircraft that can cost effectively fill the requirement for a direct kill target. MSAT targets are ground-launched with a pneumatic launcher and can be parachute recovered and reused.

10

MQM-170A Outlaw

ENGINE

Model	3W/Desert Aircraft
Power	17HP
Type	Propeller

DIMENSIONS

Length	106.29 in
Maximum height in payload	9.50 in
Maximum height	27.69 in
Wingspan	163.23 in

SPEED/ALTITUDE

Max Speed	104 kts
Max Altitude	>16,000 ft
Min Altitude	10 ft

FUEL SYSTEM

Capacity	317 Ounces per bladder max = 3 bladders
Fuel	50:1 fuel oil mixture
Standard Endurance	1 Hour
Max Endurance	2-3 Hours

TARGET WEIGHT

Standard Launch Wt	~ 90 lbs
Max Launch Wt	~120 lbs
Payload Weight Limit	~ 15 lbs
Empty Weight	~ 74 lbs

AUGMENTATION & PACKAGES

Infrared Payload
MILES Payload
Smoke Payload
Laser Reflective Tape Payload
Radar Augmentation Payload
Beyond Visual Range Payload
Others as required by user requirements.

13

13

BATS Ballistic Aerial Target System

Specs:

Rockets .....3-5 ea 2.75" rocket motors

Max Altitude..... 8,000 ft

Max Range.....23,000 ft

Augmentation & Packages

Scoring

15

15

QUH-1 Helicopter

Weight: 9,500 lbs
Payload: 1,500 lbs

Speed: Max 116 mph 100 knots

Control Sys
TTCS/U Shelter

Unmanned Drone
Ground Crew: 6
Length: 504 in
Width: 100 in
Height: 152.5 in

A full-scale QUH-1 droned aircraft utilizing surplus M model UH-1s

16

16

BATS

Weight: 192 lbs

Speed: Max 510 mph

Control Sys
None:
Fire & Forget

Launch
3 to 5 2.75”
Rocket Motors

Unmanned Rocket
Ground Crew: 4
Length: 17 ft
Diameter: 15 in.

The **Ballistic Aerial Target System (BATS)** is used primarily as a missile target for heat-seeking missile systems.

14

14

QUH-1 Target Utility Helicopter

Engine:
Model T53-L-13
Type Lycoming
Fuel:
Capacity ~90 min (max)
Type JP-8
Altitude:
Max 10,000 ft
Min 50 ft

Augmentation & Packages

Scoring-AN/DSQ-50 MDI
None on hand
ECM (DLQ-3B)-RADAR
Jamming
None on hand
ALQ-144 (IRCM)

Flares / Chaff

17

17

MQM-171A BroadSword

Engine:
Model 3W
Power 65 HP
Type Propeller
Fuel:
Capacity 3 gal per fuel bladder. Normally equipped with two bladders, but can accommodate up to four.
Type 50:1 fuel oil mix
Altitude:
Max >18,000 ft
Min 50 ft

Augmentation & Packages

Satellite data link augmentation for extended range operations.

Available in fiberglass and carbon fiber construction.

Can be augmented to meet user requirements.

19

19

JCHAAT-Tow

The JCHAAT-Tow was tracking and live fire and training. It has one diameter Luneburg the nose of the target. target meets the RCS requirement of 430.2 mes with either 6562 feet or 1050 feet of internal towline. The JCHAAT can be towed by both droned MQM-107) and manned aircraft F-16, AT-38 or Learjet).

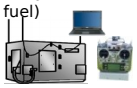
20

20

MQM-171A BroadSword

Weight: 450 lbs
Payload: 15 lbs
(may be increased by reducing fuel)

Speed: Max 125 kts



Control Sys
- Manual
- Piccolo Ground Station
- TTCS II

Launch
Pneumatic Rail Launched

Unmanned Aerial Target
Ground Crew: 4-5
Length: 165.35 in
Wing Span: 204.72 in
Height: 49.21 in

An aerial target designed to replicate the size and performance of a tactical class unmanned aircraft system that could be employed against U.S. and allied forces. Provides a realistically priced target system for use in developmental and operational testing. Available to support for RDT&E and training applications.

18

18

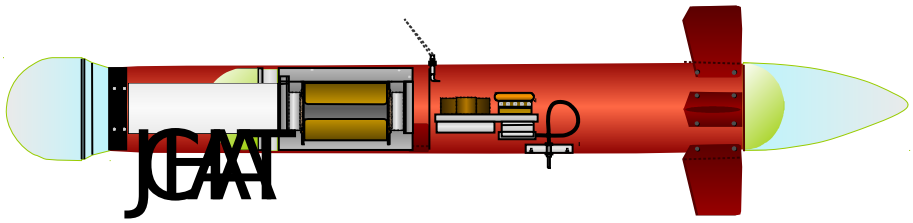
JCHAAT-Tow Target System

Physical Characteristics

Fiberglass Fuselage: 9 in Diameter
Total Target Length: 99 in
Tow Weight: 62 lbs
Towline: .065 in Braided Zylon Cable
6562 ft or 1049 ft

Target Performance

RCS: 40 m^2 in Ku Band
Maximum Speed: 450 Knots
Maximum Altitude: 35,000 ft MSL
Maneuvers: Straight and level 2G serpentine, climbs, and dive.



21

21

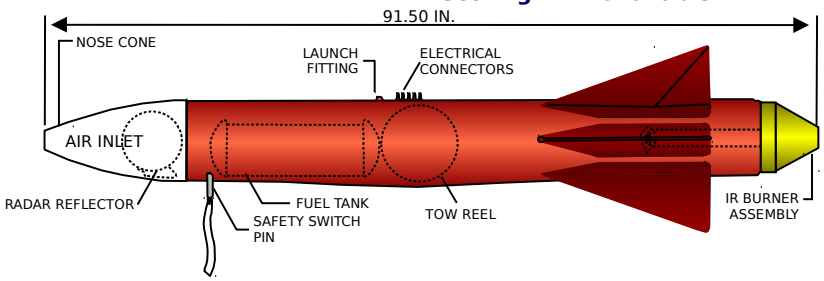
TIX-4 Infrared Tow Target

Physical Characteristics

Fiber glass fuselage: 9 in diameter
Total target lengths: 92 in
Tow weight
Steel cable: 91 lbs
Synthetic cable: 71 lbs
Tow line
Synthetic cable: .050 Zylon braided

Target Performance

RCS: 21.52 sq ft 1/J band
IR: 1100 Deg C
Max Speed: 375 knots
Altitude: 20 K msl
Maneuvers: Straight and level gentle turns, climbs, and dives
Max g 2.0
Scoring: MDI available



23

23

Aerial Gunnery Towed (AGT) Target

The air-launched Aerial Gunnery Tow (AGT) Target system provides a highly visible air-launched and ground recovered tow target for automatic weapon qualification and proficiency training. The target consists of a rigid forebody, containing an AN/DSQ-47 bullet scoring system, and a 2 ft. by 15 ft. visual augmentation sleeve.

The target system is attached to the wing mounted launch system and is equipped with an internal one-way towline reel containing 600 ft. of towline. The visual sleeve is not deployed until the target has been completely reeled out.

The AGT is designed for air-to-air and surface-to-air gun evaluation and training. Enhancement of visual augmentation and tracking is provided by a high visibility fiber streamer which is deployed from the rear compartments of the target. The AGT is employed at locations which cannot provide enough space to accommodate the 2 ft. by 12 ft. banner and is designed for a five mission service life. The AGT is towed by the MQM-107.

24

TIX-4 Infrared Tow Target

The TIX Infrared Tow was designed for weapon systems which use both and heat seeking An octahedral reflector provides approximately sq. ft. in I/J band while a propane burner can at over 1100ºC. It is towed by 5,000 feet of either mono-filament steel cable or braided synthetic (non radar-reflective) cable. Towed by MQM-107 or Learjet.

22

22

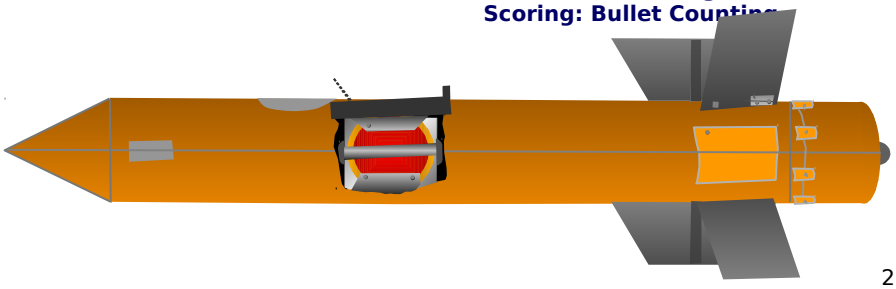
Aerial Gunnery Towed (AGT) Target

Physical Characteristics

Fiberglass Fuselage: 7 in diameter
Total Target Length: 54 in
Tow Weight: 36 lbs.
Towline: .064 in diameter stranded steel 600 ft. long

Target Performance

RCS: 10.76 sq. ft. X-Band
Maximum Speed: 275 knots
Altitude: 10,000 ft. MSL
Maneuvers: Straight and level gentle turns, climbs, and dives
Max g 2.0
Scoring: Bullet Counting



25

25

Cruise Missile Tow Target (CMTT)

Physical Characteristics

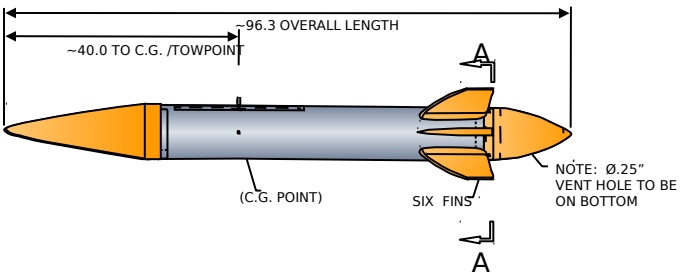
Rolled Aluminum fuselage: 9 in diameter
Total target lengths: 97” in
Tow weight : 75 lbs
Tow line: .065 in Braided Zylon 5600 ft long

Target Performance

RCS: Available on request
Max Speed: 350 knots
Altitude: 175 ft AGL to 30,000 ft
Maneuvers: Straight and level gentle turns, climbs, and dives
Max g 2.0

REAR VIEW

SECTION A-A



27

27

POTA-Tow Target System

The Omni-directional Training Aerial - Tow (POTA-Tow) was designed for tracking fire training. It has four Luneburg lenses which oriented forward, up, left right to give a large, omni-directional radar near cross section. It is towed by 4,000 ft. of Kevlar towline. The POTA-Tow can be towed by the MQM-107, Learjet, F-16, or AT-38.

28

28

Cruise Missile Tow Target (CMTT)

The Cruise Missile Tow (CMTT) is a low Radar Section tow target towed altitudes and airspeeds to that of cruise missiles. towed on 5,600 feet of transparent towline. The droop under the towing aircraft (or drone) has been verified at airspeeds from 250 knots to 350 knots. It is capable of being towed at altitudes as low as 175 feet above ground level (over relatively flat terrain) at airspeeds as high as 350 knots. The CMTT's time on station is limited only by the towing vehicle's fuel capacity. Towed by MQM-107, Learjet, or AT-38.

26

26

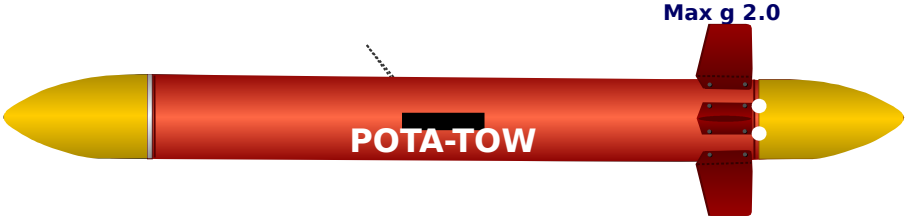
POTA-Tow Target System

Physical Characteristics

Fiberglass Fuselage: 9 1/2 in. Diameter
Total Target Length: 98 in.
Tow Weight: 69 lbs.
Towline: .065 in. Braided Kevlar Cable
4,000 ft.

Target Performance

RCS: 9.84 ft – 16.4 ft in S&C Band
Maximum Speed: 400 Knots
Maximum Altitude: 16,000 ft. MSL
Maneuvers: Straight and level gentle turns, climbs, and dive.
Max g 2.0



29

29

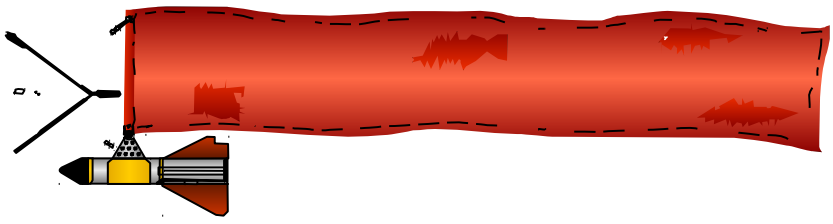
Lightweight Banner

Physical Characteristics

Scoring Available: AN/DSQ-47, CMDI-110
Towline: 550 ft of 3/8" Diameter Nylon Rope with a 50 ft steel leader

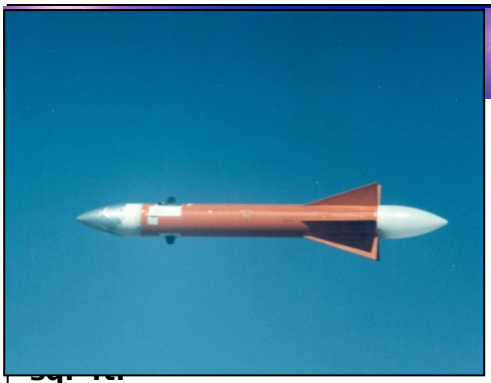
Target Performance

RCS: 10.76 sq. ft. in X Band
Speed: 200 to 300 Knots
Maneuvers: Limited to less than 3g
Scoring Volume: Approximately 6 ft by 25 ft



31

31



TRX-4A Towbee Tow Target

Actively used by the Army over 20 years, the TRX-4A TOWBEE is a radar tow specifically designed for fire exercises. The has one X-band Luneburg lens in the nose which generates an 86.08 radar cross section in a forward 60 degree cone. The TRX-4A is towed by 8,000 ft of steel towline. Towed by the MQM-107.

32

3
2

Lightweight Banner

Towed by the MQM-107, Lightweight Banner 2 ft by 12 ft banner display. Radar reflectivity is a honeycomb radar corner reflector fastened to each the bottom of the tow bar. banner is launched from ground by a "snatch" procedure during drone launch. In this maneuver, the banner tow cable is attached to the center-line tow point of the drone while it is still on the launcher and laid in front of the drone. The banner is attached to the tow cable at the farthest point from the drone. The drone is launched and, as the cable becomes taut, the banner is "snatched" into the air behind the drone. A clear area forward of the launch site, at least 600 feet long, the length of the tow cable, is required to launch the snatch banner. An onboard bullet counting scoring device is integrated into the target.

30

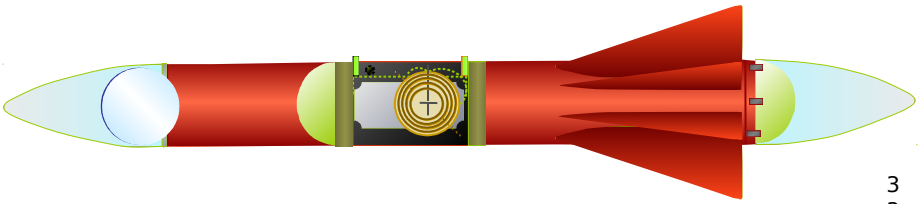
TRX-4A Towbee Tow Target

Physical Characteristics

Fiberglass Fuselage: 9 in diameter
Total Target Length: 99 in
Tow Weight: 57 lbs.
Towline: .032 in diameter monofilament steel 8,000 ft. long

Target Performance

RCS: 6.08 sq. ft. X-Band in120 degree fwd cone
Maximum Speed: 325 knots
Altitude: 30,000 ft. MSL
Maneuvers: Straight and level gentle turns, climbs, and dives Max g 2.0
Scoring: MDI



33

33

Notes

35

35

Aerial Target Flight Service Operations:
Steve Moore (256)842-6461
steve.moore1@us.army.mil

Outlaw/Broadsword:
Brian Whitaker (256)842-0379
brian.k.whitaker@us.army.mil

Outlaw/Broadsword Flight Operations:
Dale Maupin (256)842-0441 **dale.maupin@us.army.mil**

Tow Targets:
Tony Still (256)842-0377 **tony.still@us.army.mil**

36

Disclaimer

Note: The prices listed within this guide are subject to change due to sales market conditions and asset availability.

34

34